Emergency Services Solution

Management Summary & Technical Overview

Version 1

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Management Summary

The business need in this project was to reduce costs while in the process decreasing, by a minimum of two minutes, the time it takes emergency services personnel (police, fire, EMT) to reach the incident location. Ask an emergency medical doctor the benefit of reaching a patient two minutes earlier and you will be surprised at level of impact on the patient's outcome. The focus of the project was to replace the manual emergency services phone call with an electronically automated request. This project did just that, thus allowing business to reach its goal.

Backstory

- Alarm Monitoring Centers receive:
    - Signals from automated sensors located in both commercial structures and homes
    - Manually activated panic alarms requesting help for law enforcement, fire, and medical emergencies
- The Alarm Monitoring dispatcher will:
    - In some cases, attempt to verify the alarm by making contact by telephone with the persons in the residence
    - When appropriate, request the dispatch of the appropriate emergency services
- The request for emergency services is a telephone call to an Emergency Service Center dispatcher.
- The elapsed time of this call is rarely less than two minutes.

Business Objectives

- Reduce costs to both the Emergency Service Centers and the Alarm Monitoring Centers
- Enhance the ability to dispatch emergency services during a widespread emergency
- Enhance communications between Alarm Monitoring Centers and responders
- Reduce emergency response time by two minutes

Functional Requirements

- Replace telephone call with electronic messages
- Employ the existing public safety network that currently communicates with Emergency Service Centers
- Provide security to protect the highly sensitive public safety network
- Allow Alarm Monitoring Centers computers to directly communicate alarm-related messages with Emergency Service Centers dispatching computers
- Automate address verification of the places to which the Alarm Monitoring Centers may request the dispatch of emergency services
- Support continuous operations 24/7/52

Technical Requirements

- End-point support
    - Up to 200 Alarm Monitoring Centers
    - Up to 6,500 Emergency Service Centers
- Safe store requests as soon as possible to prevent lost requests
- Pass all service requests through an intrusion detection appliance (i.e., a web application firewall)
- Flow control low-priority Address Verification Requests, only permitting a configured number of in-process messages
- Do not allow flow control issues between a particular set of endpoints to impact communication between any other endpoints
- Audit everything
- Measure everything

Outcome

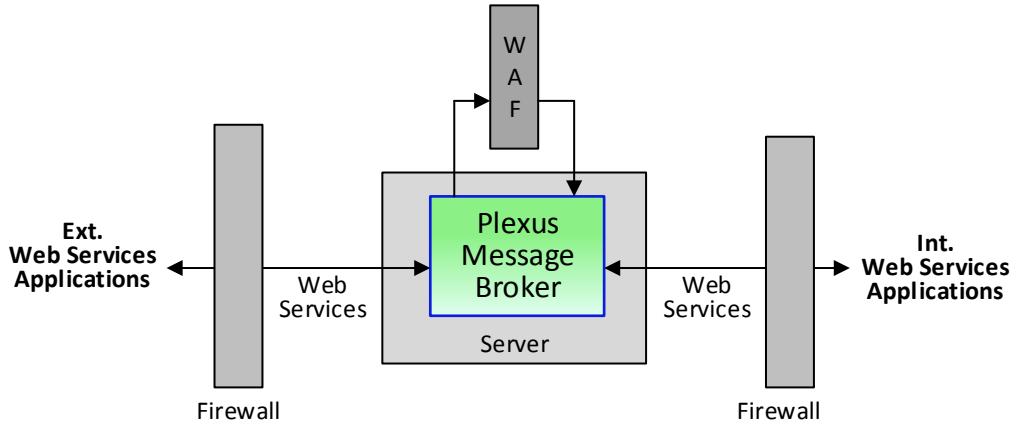
The Plexus Message Broker was modified to create an electronic interface between the Emergency Service Centers and the Public Safety Centers reducing the call time to about 0.2 seconds, eliminating the minutes it took to make a manual phone call. The business objective of reducing the emergency service response time by two minutes was achieved.

Technical Overview

This Plexus Message Broker solution features the following technology: Microsoft® MSMQ, Web Services, message flow control, message translation, and external intrusion detection appliances. This solution's site and Plexus Message Broker configurations touch on these features below.

Site Configuration

As illustrated below, this site has a single physical server that contains a single Plexus Message Broker instance connected to a single Web Application Firewall (WAF).

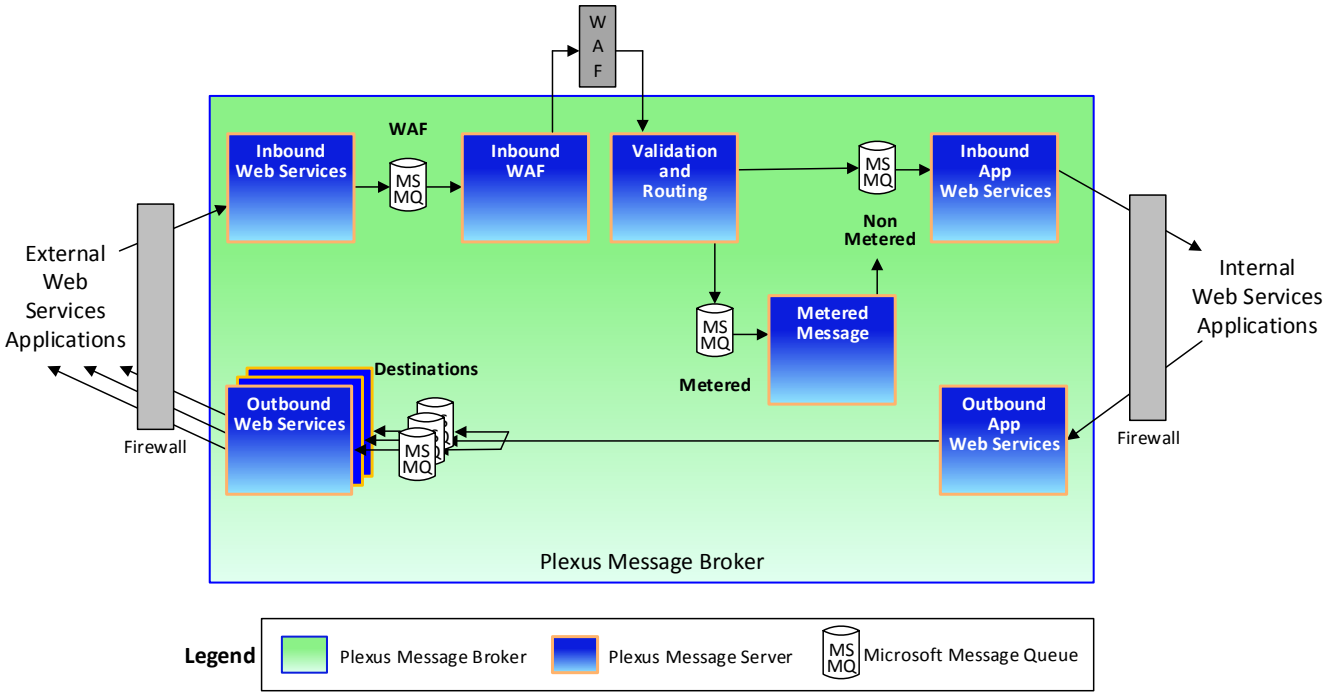


As with all Plexus Message Broker installations, adding physical servers, increasing Plexus Message Brokers instances per physical server, or transitioning to run the Plexus Message Broker in a virtual (VM) environment is only a matter of installation and configuration. No other Plexus Message Broker modifications are necessary.

It is equally possible to add WAF components as long as a load balancer is placed between the WAF and the Plexus Message Broker server. Resources are typically added for performance reasons, local redundancy reasons, or both.

Plexus Message Broker Configuration

There are seven different types of Plexus Message Servers in this Plexus Message Broker as illustrated below. On the inbound data path, a single instance of a Plexus Message Server is sufficient to manage the inbound message traffic. On the outbound path there is a separate Microsoft® MSMQ queue and a separate Plexus Message Server per destination. This configuration ensures that a bottleneck at one destination does not impact the message traffic to other destinations.

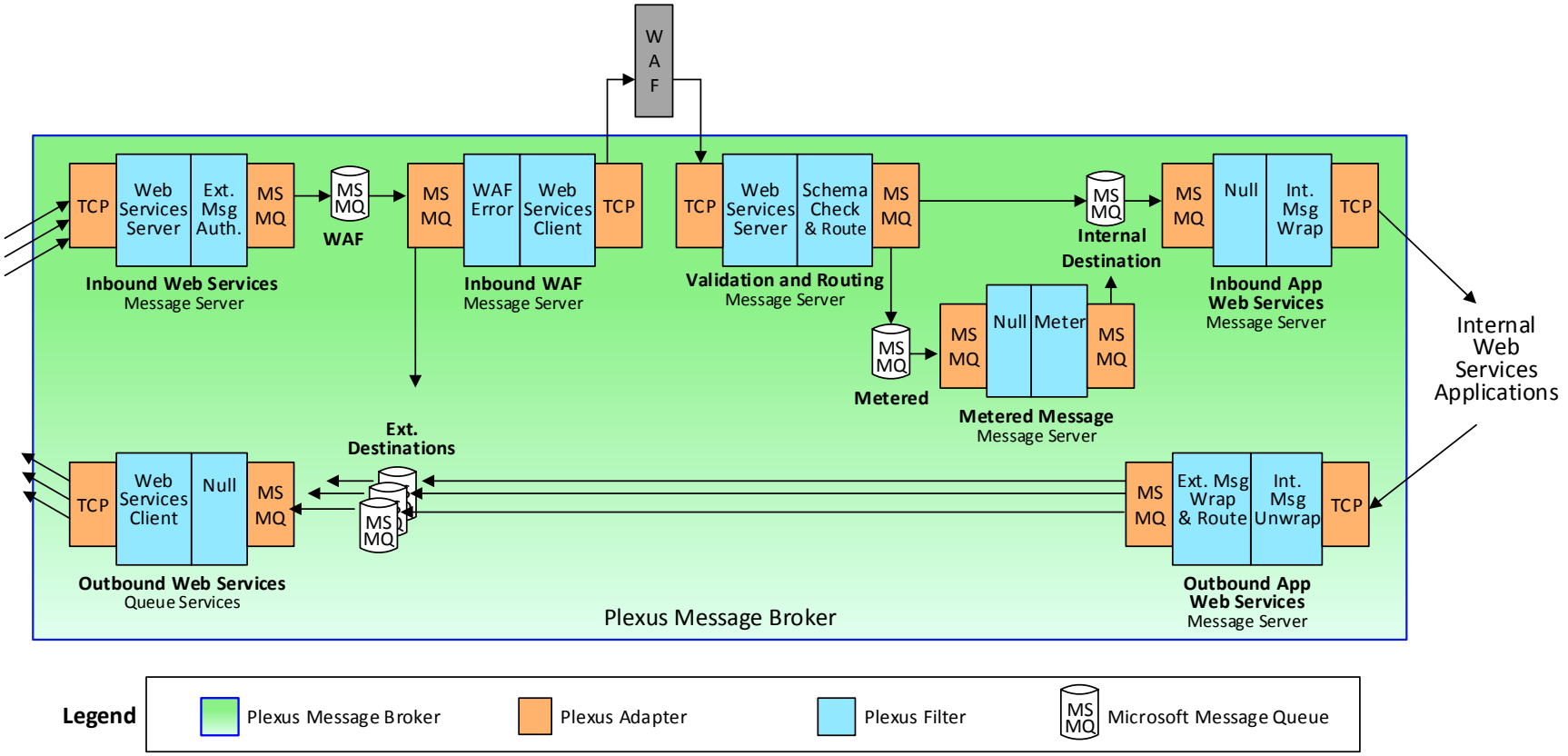


Plexus Message Server Functions

Message Server	Function
Inbound Web Services	Receives Web Services call; verifies the sender has permission to perform the requested action; extracts the message and inserts the message into the MSMQ queue; responds that the inbound message was safely stored and will be processed
Inbound WAF	Removes a message from the MSMQ queue and initiates a Web Services call passing the message to the WAF
WAF	An intrusion detection device that checks internet message for viruses. Sends a Web Services Status Notification to the Inbound WAF indicating the safety of the message.
Validation and Routing	Receives a Web Services call from the WAF containing a message that has passed the intrusion detection tests; validates the application schema; routes metered messages to the metered queue, others to the non-metered queue
Metered Messages	Removes messages from the metered queue in a fashion that does not flood the system
Inbound App Web Services	Removes messages from the non-metered queue; wraps message in an internal application SOAP header; executes a Web Services call to the back-end application
Outbound App Web	Receives a Web Services call from the back-end application; validates the message and inserts the message into the correct destination queue
Outbound Web Services	Receives a message from a destination queue; wraps the message in the destination's SOAP header; and sends to destination via Web Services

Plexus Message Server Details

The following figure drills down into the configuration of the Plexus Message Broker; in particular it provides insight into the Adapters and Filters used by each Plexus Message Server in this solution.



Adapters

Adapter	Description
TCP Adapter	In all cases, the TCP adapter is associated with a Filter that provides Web Services over TCP.
MSMQ Adapter	An Adapter that receives and sends messages to Microsoft® messaging queues

Filters

Filter	Description
Web Services Server	Receives inbound Web Services call over TCP
Web Services Client	Initiates Web Services calls over TCP
WAF Error	Handles messages identified by WAF as infected and routes them back to destination queues for client notification
Schema Check & Route	Validates XML document; determines priority of message; and routes to the appropriate queue
Meter	Ensures that only the configured number of low priority messages are in-process at any one point in time
Internal Message Wrap	Wraps the data message in the back-end application SOAP header and sends it to the back-end application
Internal Message Unwrap	Unwraps the back-end application SOAP header and validates the XML schema
Null	A placeholder for a Filter